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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/572,971	03/22/2006	Warren Thomas Johnson	2005P11585WOUS	3709
28524 7590 08/12/2009 SIEMENS CORPORATION INTELLECTUAL PROPERTY DEPARTMENT 170 WOOD AVENUE SOUTH ISELIN, NJ 08830				
EXAMINER ANDERSON, DENISE R				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/572,971

**Applicant(s)**

JOHNSON, WARREN THOMAS

**Examiner**

Denise R. Anderson

**Art Unit**

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 July 2009.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.  
4a) Of the above claim(s) 12 and 13 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-11 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 22 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-85/86)  
Paper No(s)/Mail Date 21 July 2009  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Inventor's Patent Application  
6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

#### ***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 21, 2009 has been entered.

#### ***Claim Rejections - 35 USC § 103*** ***Nakatsuka Reference***

3. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatsuka (Patent Pub. No. JP11076769, Mar. 23, 1999 – The esp@cenet Abstract in English, Patent Publication, Translation), in view of Ford et al. (U.S. Patent No. 4,931,186, Jun. 5, 1990) for the explicit disclosure of immersed membranes.

4. Claim 1 recites a filtration step (i), introducing a cleaning solution into the lumens (ii), and applying a gas at a pressure below the bubble point (iii) to displace some of the cleaning solution within the lumens through the membrane pores. Claim 10 recites that the gas is pulsed. Nakatsuka discloses these, beginning with the filtration step.

5. Regarding the filtration step, Nakatsuka discloses that “the filter membrane module is a hollow yarn membrane module.” Nakatsuka, Translation, ¶ 9, line 2. In Fig. 1, Nakatsuka

teaches, "[U]ntreated river water (ground water) 1 obtained from the river was supplied from water supply pipe 16, and the filtration treatment initiated" and further teaches that filtrate is collected in permeated water tank 13. Nakatsuka, Translation, ¶ 22, lines 4-5.

6. Regarding introducing a cleaning solution to the lumens (ii) and applying a gas at a pressure below the bubble point (iii) -- Nakatsuka discloses, "A method for cleaning a filter membrane module to restore water permeability . . . by means of a liquid chemical . . . [and] pressurizing with a gas . . . provided from the permeation side of the filter membrane . . . at least at one point of time before or after the liquid chemical is supplied to the filter membrane module, or at both points of time, under a pressure of at least 20 kPa but below the bubble point for 0.1-5 min." Nakatsuka, Translation, Claim 1. Nakatsuka further teaches, "The liquid chemical may be circulated from the permeation side of the filter membrane to the untreated water side." ¶ 18, lines 12-13.

7. Nakatsuka discloses the claimed invention but only implies that it is known in the art to immerse the hollow fiber membranes in the unfiltered liquid, as recited. Specifically, Nakatsuka states, "[W]hen a hollow yarn membrane module is used, the internal pressure system in which the stock solution flows inside the hollow yarn membrane is desirable." In Fig. 2, Ford et al. discloses that immersing hollow fiber membranes is known in the art and that such a configuration provides a "means for applying liquid followed by gas under pressure to the fibre lumens to effect a transmembrane cleaning of the fibres." Ford et al., col. 5, lines 13-15. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Nakatsuka method, to have immersed the hollow fiber membranes in the unfiltered liquid as taught by Ford et al., since Ford et al. states at col. 5, lines 13-15, that such

configuration would allow for a “transmembrane cleaning of the fibres” by “applying liquid followed by gas under pressure.”

8. In summary, Nakatsuka, in view of Ford et al. for the explicit disclosure of immersed membranes, discloses or suggests all claim 1 limitations.

9. Independent claim 2 recites all claim 1 limitations and further recites that the applied gas will “overcome the bubble point of the membrane.” Nakatsuka, in view of Ford et al., discloses the claimed invention. Ford et al. further teaches applying the gas to overcome the bubble point of the membrane when Ford et al. states, “ In one form of the invention, the application of the pressurised gas is initially conducted so as to backwash the full length of the fibres by displacing any lumen liquid with gas at a pressure below the bubble point of the walls of the fibres. The shell is then sealed with the relatively incompressible feed liquid so that gas cannot flow through the fibre walls as the pressure of the trapped gas is raised beyond the bubble point. The liquid seal is then released to allow the trapped gas to escape substantially uniformly through the fibre walls except for applying the gas to overcome the bubble point of the membrane.” Ford et al., col. 4, lines 30-37. It would have been obvious to one having ordinary skill in the art at the time the invention was made, in the Nakatsuka method, to have applied the gas to overcome the bubble point of the membrane as taught by Ford et al. since Ford et al. states at col. 4, lines 25-29, that such a modification would “dislodge any solids retained in those pores and [would] wash the external walls of the fibres and the interior of the shell to remove all solids from the shell to an external collection point.”

10. Independent claim 2 further recites that the retained solids from the membranes are dislodged while concurrently draining the chemical cleaning solution from the lumens.

Nakatsuka discloses this in Fig. 2 when Nakatsuka states “cleaning with a liquid chemical is done . . . in a single step or a multiple-step combination” and shows valves 33 and 28 that drain membrane module 21 for the multiple-step cleaning combinations. Nakatsuka, Translation, Claim 6.

11. In summary, Nakatsuka, in view of Ford et al. for the explicit disclosure of immersed membranes and for applying the gas to overcome the membrane’s bubble point, discloses or suggests all claim 2 limitations.

12. Claims 3-11 ultimately depend on claim 1. Nakatsuka, in view of Ford et al., disclose the claimed invention. Nakatsuka teaches a continuous cycle of solid accumulation and removal [claim 3] when Nakatsuka discloses that a continuous process was run for eight months with a backwash cycle run once every 45 minutes for 1 minute. Nakatsuka, Translation, ¶ 22, lines 8-10. Claims 4-9 depend on claim 1 and recite using a chemical cleaning solution [claim 4] which is added either to the outside of the membranes [claims 5 and 7], the inside of the membranes [claim 6] or both sides of the membrane [claims 8 and 9]. Nakatsuka discloses, “The liquid chemical used at the time of the liquid chemical cleaning may be circulated in the untreated water side of the filter membrane or may be circulated from the untreated water side to the permeation side. Furthermore, the liquid chemical may be circulated from the permeation side of the filter membrane to the untreated water side as well.” Nakatsuka, Translation, ¶ 18, lines 10-12.

13. Nakatsuka further teaches that “cleaning with a liquid chemical is performed with one or

two or more different types of chemicals” in a “single step or a combination of multiple steps” with “the gas pressurizing process [which] may be applied before, during or after the aforementioned cleanings.” Nakatsuka, Translation, ¶ 18, lines 3-5 and 9-10. In summary, Nakatsuka discloses using a chemical cleaning solution [claim 4] which is added either to the outside of the membranes [claims 5 and 7], the inside of the membranes [claim 6] or both sides of the membrane [claims 8 and 9] with gas backwash suitably put among the washings in any order.

13. Claim 10 recites that the gas is pulsed in its application to the membrane lumens. Referring to Fig. 1, Nakatsuka discloses, “[A] back washing process consisting of supplying the permeated water from the permeation side of the filter membrane module for 1 min at a ratio of once every 45 min is provided and the water recovery percentage is 90%. During the course of the back wash operation, the two-way valve 7 is opened and the two-way valves 6 and 8 are closed and pump 14 is stopped. Furthermore, a backwash operation consisting of supplying a portion of the permeated water to the permeation side of the filter membrane module 11 through pump 15, which is the reverse of the normal operation, is periodically provided.” Nakatsuka, Translation, ¶ 20, lines 10-16. In other words, the method includes a backwash once every 45 minutes for 1 minute. The backwash uses the filtrate and is “periodically carried out,” i.e. the backwash is pulsed, as recited in claim 10. As discussed in the claim 1 patentability analysis, Nakatsuka discloses applying gas at a pressure below the bubble point to the membrane lumens to progressively displace the cleaning solution within the lumens through the pores. As such, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have pulsed the gas in the Nakatsuka method since it was known in the art that pulsing

the gas below the bubble point would have pulsed the cleaning solution analogous to pulsing the backwash. This is an example of using a known technique (pulsing solution) to improve similar methods (backwash with water, backwash with cleaning solution) in the same way (membrane cleaning is enhanced).

14. Claim 10's pulsed gas backwash is also disclosed by Ford et al. when Ford et al. states, "Thus the combined pulsed permeate/gas pulse system of the invention is far superior to backwashing with permeate alone in known fashion." It would have been obvious to one having ordinary skill in the art at the time the invention was made to have pulsed the gas in the Nakatsuka method as taught by Ford et al., since Ford et al. states, at col. 15, lines 14-15 that such a modification "effect[s] a transmembrane cleaning of the fibres."

15. Claim 11 recites removing at least part of the bulk liquid before the backwashing step. Nakatsuka discloses such removal is done through open valve 7 in Figure 1 and open valves 33 and 28 in Figure 2.

16. In summary, Nakatsuka, in view of Ford et al. for the explicit disclosure of immersed membranes anticipates all limitations recited in dependent claims 3-11.

#### ***Response to Arguments***

17. Some of applicant's arguments with respect to claims 1-11 have been considered but are moot in view of the new ground(s) of rejection. Applicant's remaining arguments filed July 20, 2009 have been fully considered but they are not persuasive.

18. Applicant's remaining arguments are listed below with the examiner's response after each argument.



- a. Regarding claim 1, applicant argues that "the gas pressurization process in Nakatsuka is not used to displace a chemical solution as set forth in claim 1" because Nakatsuka teaches, "[I]t is desirable when the aforementioned treatment is done prior to supplying the liquid chemical to the filter membrane module" with the aforementioned treatment referring to the gas process. Applicant's Remarks, p. 3, lines 19-20 and p. 4, lines 13-16. The Nakatsuka cite comes from ¶ 12, lines 5-6.

The claim 1 limitation being discussed follows:

*. . . (iii) applying a gas at a pressure below the bubble point to the membrane lumens to progressively displace at least some of the chemical cleaning solution within the lumens through the membrane pores . . .*

The examiner responds as in the above patentability analysis. Nakatsuka discloses, "A method for cleaning a filter membrane module to restore water permeability . . . by means of a liquid chemical . . . [and] pressurizing with a gas . . . provided from the permeation side of the filter membrane . . . at least at one point of time before or after the liquid chemical is supplied to the filter membrane module, or at both points of time, under a pressure of at least 20 kPa but below the bubble point for 0.1-5 min." Nakatsuka, Translation, Claim 1. Nakatsuka further teaches, "The liquid chemical may be circulated from the permeation side of the filter membrane to the untreated water side." ¶ 18, lines 12-13. As such, Nakatsuka meets the recited claim 1 limitation even if the embodiment is not the preferred embodiment. As stated in MPEP 2123, "A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments.

*Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.),  
*cert. denied*, 493 U.S. 975 (1989).”

- b. Applicant argues, “Ford discloses the use of a shock wash which stretches the pores. As such, Ford does not even contemplate the use of pressure which is below the bubble point for progressively displacing the chemical cleaning solution.” Applicant’s Remarks, p. 6, lines 1-3.

The examiner responds as in the above patentability analysis. Nakatsuka was cited for the use of pressure below the bubble point in claims 1-11. Ford et al. was cited for the use of pressure below the bubble point and then rising above the bubble point, as recited in independent claim 2.

Specifically, Ford et al. teaches applying the gas to overcome the bubble point of the membrane when Ford et al. states, “ In one form of the invention, the application of the pressurised gas is initially conducted so as to backwash the full length of the fibres by displacing any lumen liquid with gas at a pressure below the bubble point of the walls of the fibres. The shell is then sealed with the relatively incompressible feed liquid so that gas cannot flow through the fibre walls as the pressure of the trapped gas is raised beyond the bubble point. The liquid seal is then released to allow the trapped gas to escape substantially uniformly through the fibre walls except for applying the gas to overcome the bubble point of the membrane.” Ford et al., col. 4, lines 30-37.

- c. Applicant argues, "Neither Nakatsuka nor Ford et al., alone or in combination, suggest Applicant's inventive process where alternating filtration and reverse flow using gas pressure are used to draw a chemical cleaning solution back and forth through the membrane in repeated cycles." Applicant's Remarks, p. 6, lines 4-7.

The examiner will interpret this argument to refer to claim 10's limitation shown below:

*Claim 10 (previously presented) A method of concentrating the solids of a liquid suspension according to claim 1 wherein the gas is pulsed in its application to the membrane lumens.*

The examiner responds as in the above patentability analysis. Referring to Fig. 1, Nakatsuka discloses that the backwashing step is "periodically provided" or pulsed. Nakatsuka, Translation, ¶ 20, lines 10-16. In other words, the method includes a backwash once every 45 minutes for 1 minute. As was discussed in the claim 1 patentability analysis, Nakatsuka discloses applying gas at a pressure below the bubble point to the membrane lumens to progressively displace the cleaning solution within the lumens through the pores. As such, it was known in the art that pulsing the gas below the bubble point pulses the cleaning solution, analogous to pulsing the backwash. This is an example of using a known technique (pulsing solution) to improve similar methods (backwash with water, backwash with cleaning solution) in the same way (membrane cleaning is enhanced).

As in the above patentability analysis, the examiner provided a second response. Ford et al. states, "Thus the combined pulsed permeate/gas pulse system of the

invention is far superior to backwashing with permeate alone in known fashion.”

There would have been motivation to combine Nakatsuka method with the gas pulse taught by Ford et al. since Ford et al. states, at col. 15 lines 14-15 that such a modification “effect[s] a transmembrane cleaning of the fibres.”

### *Conclusion*

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Denise R. Anderson whose telephone number is (571)270-3166. The examiner can normally be reached on Monday through Thursday, from 8:00 am to 6:00 pm.

20. If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Walter D. Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

21. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

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like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DRA/

/Walter D. Griffin/

Supervisory Patent Examiner, Art Unit 1797